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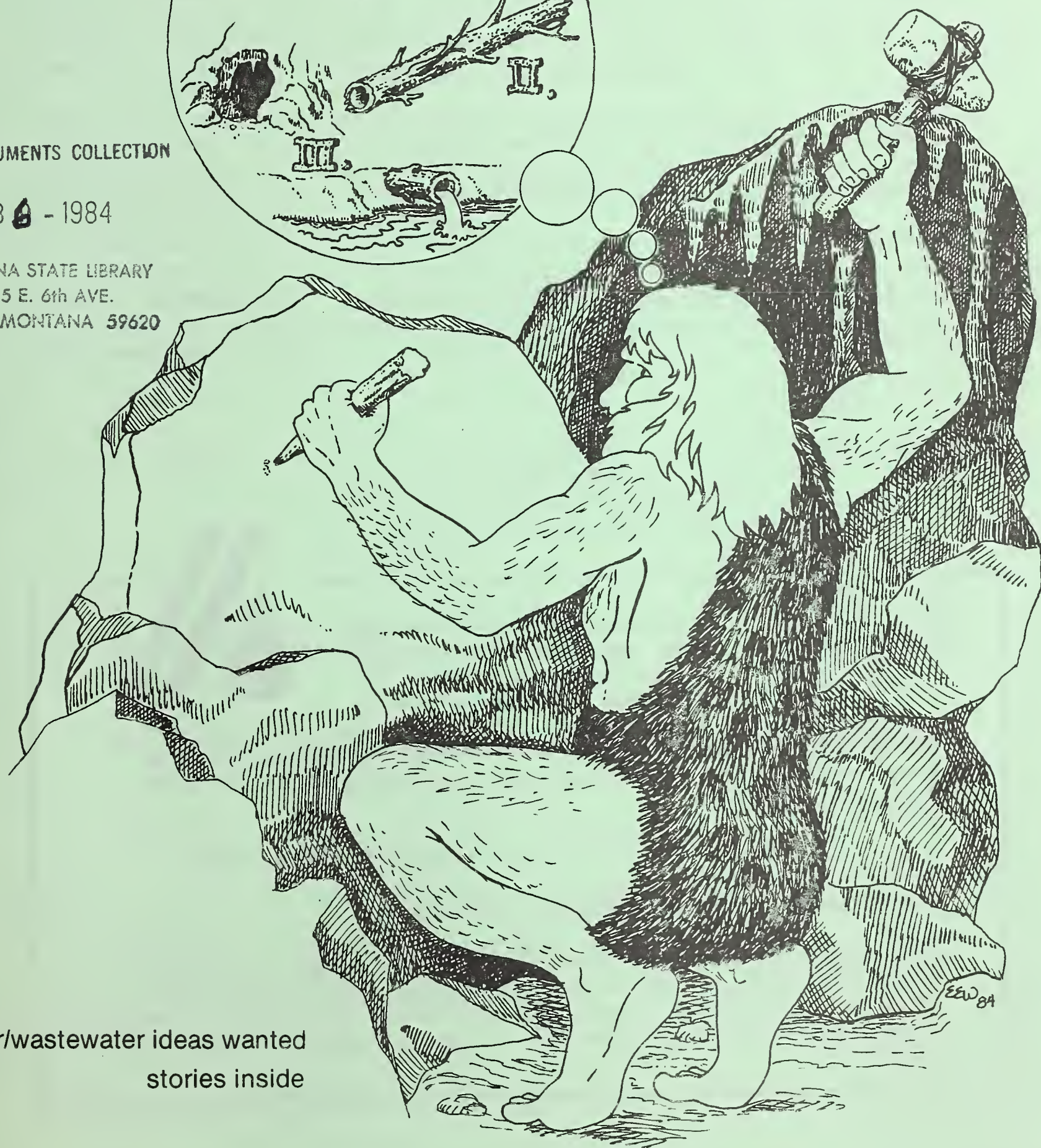
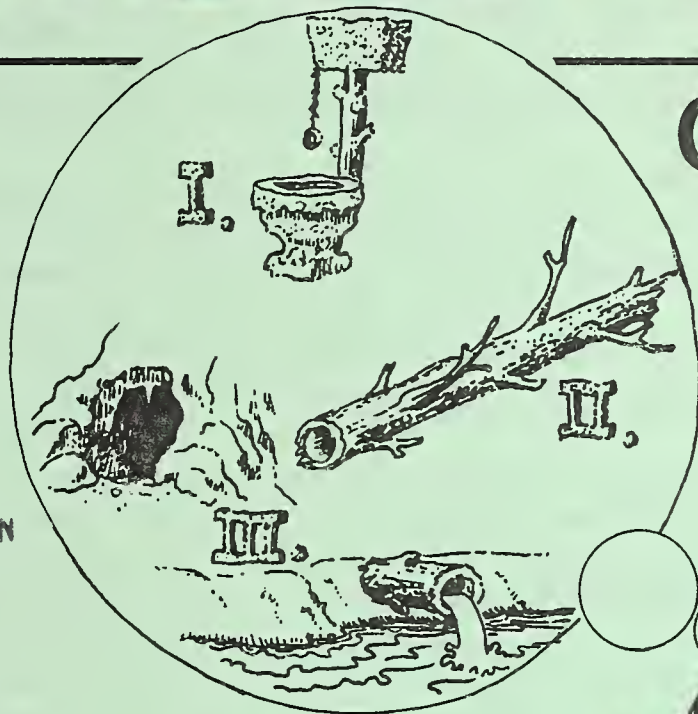
WINTER, 1984

Conference Issue

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water/wastewater ideas wanted
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operators across Montana--is
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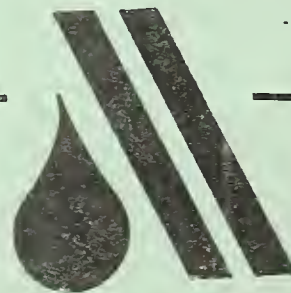
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59620.



Electric City Hosts Convention

MSAWWA, MWPCA to meet in Great Falls

The Joint Conference of the Montana Section of the American Water Works Association (MSAWWA) and the Montana Water Pollution Control Association (MWPCA) will be held March 28 - 30, 1984 at the Heritage Inn in Great Falls. Remember that last year's convention coincided with Bozeman's centennial celebration? Well, we've done it again. Great Falls will be celebrating their centennial during this year's convention.

A series of five dams in the Great Falls area generate electric power from the waters of the mighty Missouri River; hence the electric nick-name. The Missouri River flows through the center of the city. Before damming the river, there was actually a "great" water fall. The falls can still be seen; however, their former grandeur has been diminished. When Lewis and Clark were making their way up the Missouri, the "great falls" slowed them considerably.

This year's convention will offer the attendees something new by allowing equipment manufacturers to display their equipment in a separate exhibit room. The planned programs will include technical and informative topics pertinent to the water and wastewater industry. The ladies program will offer varied and entertaining activities.

A pre-registration form follows which must be returned by March 1, 1984 if you wish to pre-register. Registration will be conducted during the conference for those not pre-registering. We are sure to have an excellent convention Hope to see you there.

PROGRAM SCHEDULE FOR JOINT CONFERENCE MSAWWA-MWPCA MARCH 29TH AND 30TH, 1984

Thursday, March 29th, 1984

Joint Session

10:00 a.m.	<u>Electric Power: Methods for Reliable Service</u> Verne Brown Montana Power Company
10:40 a.m.	<u>Infrastructure: A National Concern</u> Dana Huestis Falls Construction Company, Inc.
11:20 a.m.	<u>Water and Wastewater Protective Coatings</u> Bruce Campbell Tnemec Company, Inc.
12:00 p.m.	LUNCH

Session 1

- 1:30 p.m. Pipe Joint "Know How"
Collins Orton
Rockwell International Corporation
- 2:15 p.m. Radial Infiltration Galleries
Fred C. Mikels
Ranney Division, Hydro Group, Inc.
- 3:00 p.m. Cold Water Treatment: Design and Operational Considerations
Scott Trusler
CH₂M Hill
- 3:30 p.m. EXHIBIT AREAS OPEN
- 7:30 p.m. Get Acquainted Dinner Party--poolside, Heritage Inn

Session 2

- 1:30 p.m. Plant Influent Mechanical Screening Options
Warren Myers
Goble Sampson Associates
- 2:15 p.m. Montana Pollution Discharge Elimination System Programs
Fred Shewman
Dick Pedersen
Montana Water Quality Bureau
- 3:00 p.m. Computers in Everyday Operations
David Dickson
Envirotech Operating Services
- 3:30 EXHIBIT AREAS OPEN
- 7:30 Get Acquainted Dinner Party--poolside, Heritage Inn

Friday, March 30th, 1984

Session 1

- 8:00 a.m. Disinfection Alternatives
Martha Dow
Northern Montana College
- 8:45 a.m. Ferric Chloride For Color Removal In Water
Hunter Nolan
Montana State University, Bozeman
- 9:30 a.m. Research: Pipe Frost Loading, Corrosion, Restrained Joints
Deon Fowles
Ductile Iron Pipe Research Association
- 10:15 a.m. BREAK
- 10:30 a.m. Water Treatment Innovations
Irv Hansen
Con-Tro-Flo Company, Inc.

11:30 a.m. LUNCH

Session 2

8:00 a.m. Montana Uniform Municipal Accounting
Nathan Tubergen
City of Great Falls

8:45 p.m. Small Lab: You Can Do It
Deanna Anderson
Montana Tech, Butte

9:30 a.m. Solids Handling: The Billings Evaluation
Gerald Underwood, City of Billings
Jim Henson, Black and Veatch

10:15 a.m. BREAK

10:30 a.m. Training For Improved Wastewater Plant Performance
Jim Schultz
Bob Hegg
Process Applications, Inc.

11:30 a.m. LUNCH

Joint Session

1:00 p.m. Maintenance Management: Systems That Work
John D. Reese
Black and Veatch

1:45 p.m. Personal Finance: Investing For You and Yours
Burt Thurber
D. A. Davidson and Company

2:30 p.m. Business Meeting

3:30 p.m. EXHIBIT AREAS OPEN

7:30 p.m. Banquet, awards--poolside, Heritage Inn

9:30 p.m. Dance--poolside, Heritage Inn (Music: Shadetree)

WIZARD OF ID



Ladies Program

Thursday, March 29th

- 9:00 a.m. Continental breakfast, poolside, Heritage Inn
- 10:30 a.m. Leave the Heritage Inn for a tour of Paris Gibson Square.
Demonstrations provided by artist and craftsmen in residence at
the Square (Sales gallery available).
- Noon Luncheon at Paris Gibson Square Conservatory.
- 1:00 p.m. Lecture and show of period fashions by Marcia Stagmiller of the
Great Falls Centennial Committee.
- 2:00 p.m. Tour of C. M. Russell Museum and Art Gallery including the
Charles Marion Russell original studio (Sales gallery available).
- 7:30 p.m. Get Acquainted Dinner Party--poolside, Heritage Inn.

Friday, March 30th

- 9:00 a.m. Continental breakfast--poolside, Heritage Inn.
- 10:00 a.m. Demonstration and workshop on making silk flowers, or color
analysis and make-up demonstration.
- 11:30 a.m. Lunch
- 1:30 p.m. Leave the Heritage Inn for shopping.
- 2:30 p.m. Coffee hour provided by the Holiday Village Shopping Center.
- 7:30 p.m. Banquet, awards--poolside, Heritage Inn.
- 9:30 p.m. Dance--poolside, Heritage Inn (Music: Shadetree).

pre-registration form

SEND TO: Host City Committee, P.O. Box 547, Black Eagle, MT 59414

\$65.00 _____ Member Registration \$30.00 _____ Ladies Registration

\$75.00 _____ Non-Member Registration \$40.00 _____ One-Day Registration

Enclosed please find a check, purchase order, or warrant payable to Host City
Committee AWWA/WPCF in the amount of \$ _____.
(Pre-registration must be received by March 1, 1984.)

NAME _____ TITLE _____

UTILITY, CITY, CO., _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

IF ATTENDING: WIFE'S NAME _____

MEMBER AWWA ☐

MEMBER WPCF ☐

NON-MEMBER ☐

Operator Articles, Got Any Ideas?

Dick Montgomery
EPA, Montana Office

Every year at the annual conference I hear attendees enthusiastically exchanging ideas or experiences to the humor or learning benefit of each other.

Sure, we all have to save a few good tales to keep the bull sessions going, but this year why not take your best one and tell it to everybody?

Write it down and send it in. There's a good chance everyone will read it in the Big Sky Clearwater and you might even win a prize.

Don't give that "but I can't write" excuse; if you can read this then you can write. If you can't type, use a pen. If you don't like ink, use a pencil. If you are afraid of sharp instruments, use a crayon. If you have never used a crayon then now is the time to learn, and next year you can use that experience as your topic.

To qualify for printing in the Big Sky Clearwater there are a few rather rigid requirements which must be met.

1. It must be written in English or some other language which can be translated with relative ease; Sanskrit we can't handle, pig-Latin is fine.
2. It must be suitable for presentation in mixed company--don't hesitate to send in the other stuff; what we enjoy reading and what we can print are two different critters.
3. It must be legible--we have some problems with tan crayon on grocery bag paper. If you are into chiseled slate and want the original back, please include return postage.

To qualify for the gimmicks and gadgets award, in addition to meeting criteria for publication, your entry must deal with a process, technique, instrument, etc., which you have developed to aid in construction operation or maintenance in the water and wastewater fields.

The other award category is "Professional Papers" and topics here are almost unlimited. There is a requirement that entries in this category be on 8-1/2 x 11 inch paper and submitted before February 15. While the rules don't require typing, I think crayon script is out in this category.

If you're interested in submitting a "professional paper" let me know and I'll send a copy of the detailed rules. If you're interested in "gimmicks and gadgets" or providing something for the Big Sky Clearwater scribble it on anything handy with anything handy (that may be a tale in itself), and send it to me:

Dick Montgomery, Chairman
Technical Papers Committee
2326 Hauser Blvd.
Helena, Montana 59601

Valve Key Idea

In our last issue, Joe Tillo, who operates the water system at La Casa Grande Estates in East Helena, shared his idea for removing rocks from valve boxes. His invention works well and saves the work of digging the valve up to remove rocks. Hopefully, some of you have tried making and using one.

Joe, has lots of good ideas. Most are born out of a genuine desire to avoid unnecessary work. Before you go to all of the work involved in digging up and straightening a curb cock stand pipe, read on.

Many times during excavation work, stand pipes are pushed out of alignment just enough to make it impossible to get an ordinary key on the valve to open or close it. So what do you do? Dig it up and straighten the stand pipe? Not if you are Joe Tillo. Joe has another invention to share with us which not only solves this problem, but also will help to tidy your pick-up truck.

It's a valve key that bends in the middle giving enough play to allow it to operate in a poorly aligned stand pipe. When not in use it folds completely in half to allow for neat and easy storage in your truck or even in the trunk of a car!

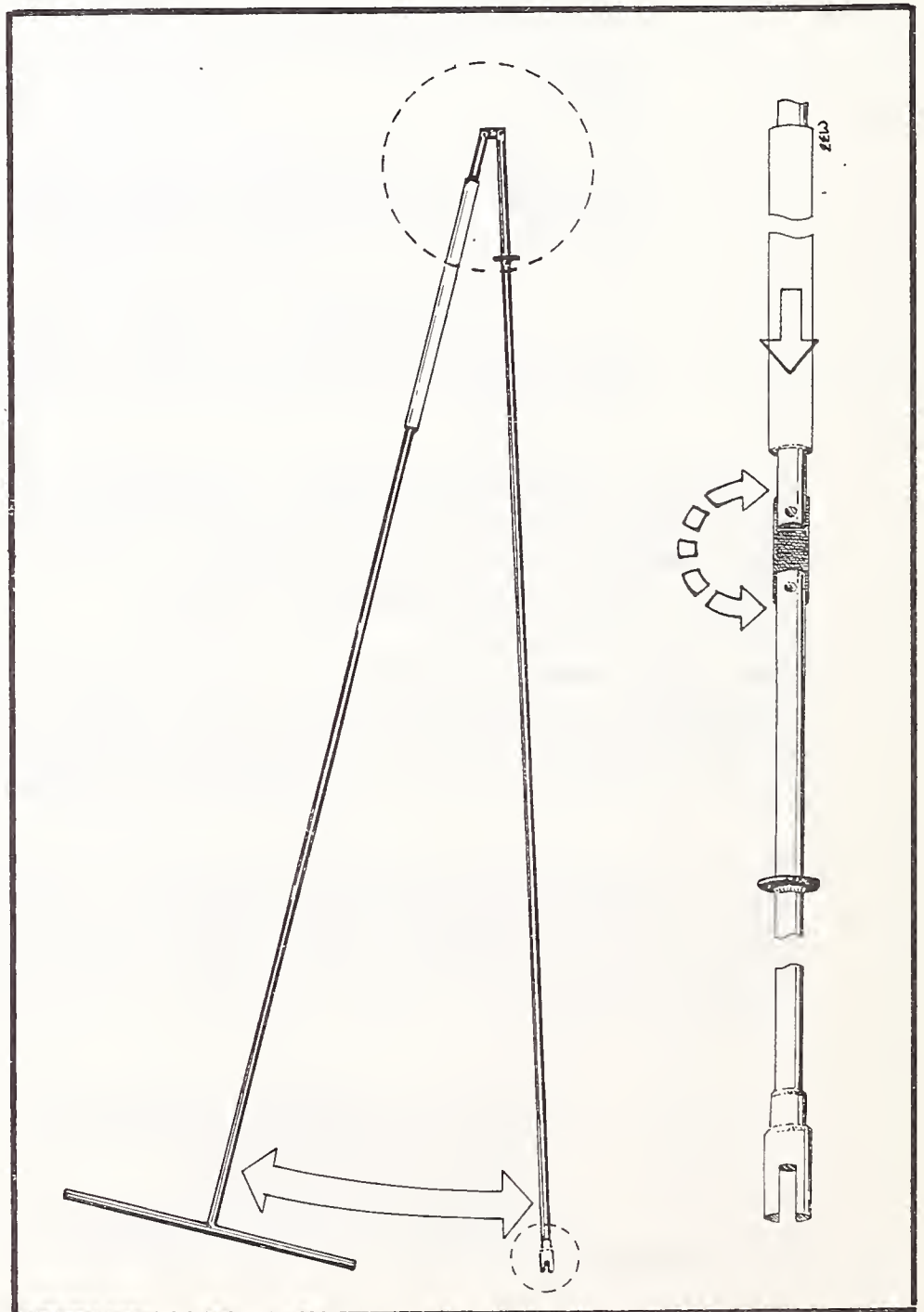
The Key is 104" long, 52" when folded, with a 14" "T" handle. It is designed to lay flat when folded. Joe's was made from 5/8" round steel rod. The double action hinge in the middle was fabricated from a piece of steel 2" long, 1/4" thick, and 5/8" wide. Steel pins attach it to the rod. A washer was welded on the rod 6" below the center to hold a 1/2" dia., 2' long piece of PVC plastic pipe. The pipe slides over the hinge to make the key straight yet allow enough flexibility to maneuver the key in crooked stand pipes.

The slotted key portion at the bottom was connected to a pipe nipple and spot welded. This was then welded to the end of the round rod. All outer surfaces were carefully smoothed and

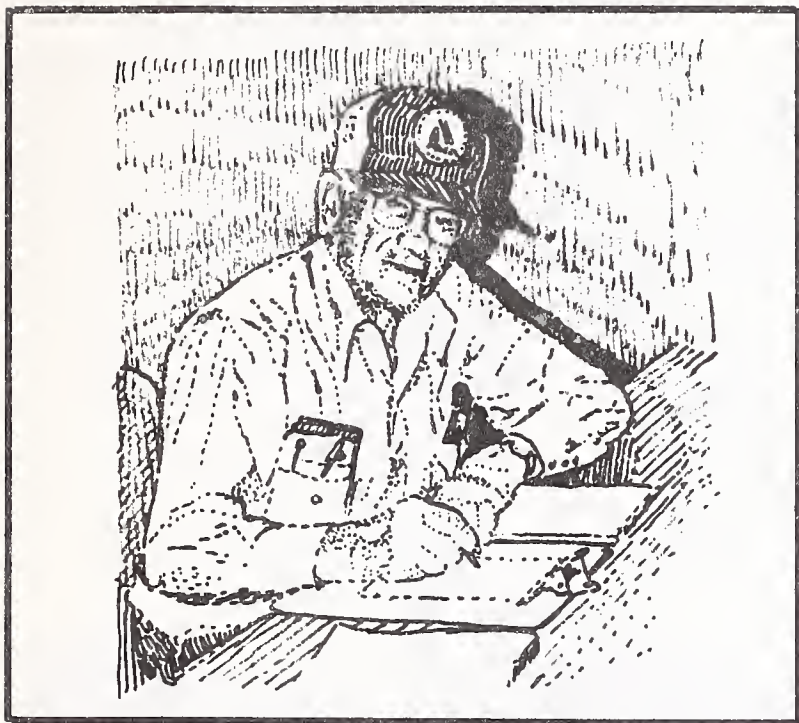
rounded so that the key can be pulled up without catching on any sharp surfaces. Thanks again, Joe, for sharing another great idea!

By the way, both of Joe's inventions have been submitted to the Gimmicks and Gadgets contest in AWWA's Opflow magazine. Entries are judged on the basis of originality, simplicity, adaptation, application, and savings of time, manpower, money, (and grief)! If any of you have ideas or inventions you're hiding from the rest of us, let us know. You might even win a contest! Send your ideas to:

Tim Hunter, Editor
Big Sky Clearwater
MDHES - WQB
Room A-206, Cogswell Building
Helena, Montana 59620



Operator Profile



Bill Glenn ... Chinook

by Denise Osterman

William Hamilton Glenn was born south of Miles City in 1910. He ranched most of his life in the Miles City area. In 1951, because of a severe drought, he and his wife Laura took their cattle to the Fort Peck Reservation where they continued ranching until 1959. When they moved to the Missouri Breaks area, they continued to ranch for another seven years. In 1967, Bill and Laura sold all but a few of their cattle and Bill started a new career in the field of water treatment, working for the town of Harlem. He served as superintendent of the Harlem plant until 1976. Bill had obtained his Class 2 water, wastewater, and distribution licenses under the grandfather clause while working in Harlem.

In 1977, when the town of Chinook built a new water treatment plant, the city officials asked Bill to be superintendent. In order to comply with the certification law, Bill attended winter quarter at NMC, taking several courses in the water and wastewater technology program to prepare for the Class 1 water certification exam. In early 1978, Bill passed his exam and, in addition, has since become certified as a Class 1 wastewater plant operator.

The plant in Chinook is a conventional treatment system consisting of coagulation, flocculation, sedimentation, and filtration. The water supply is obtained from the Milk River, which is a difficult source to treat due to the small size of the turbidity particles and dissolved substances which cause color. Bill has been a totally dedicated employee, making sure to protect the health of those consuming the water he treated. It was not uncommon for Bill to be at work by 6:00 a.m., and he never complained when he was called in during the night or while on vacation to handle emergencies.

Throughout his life, Bill's most ardent hobby has been rodeoing. Over the years he has competed in calf roping and team roping with his son, Jay. He has also been a judge for high school rodeos. Bill was named in the latest edition of Who's Who in the West.

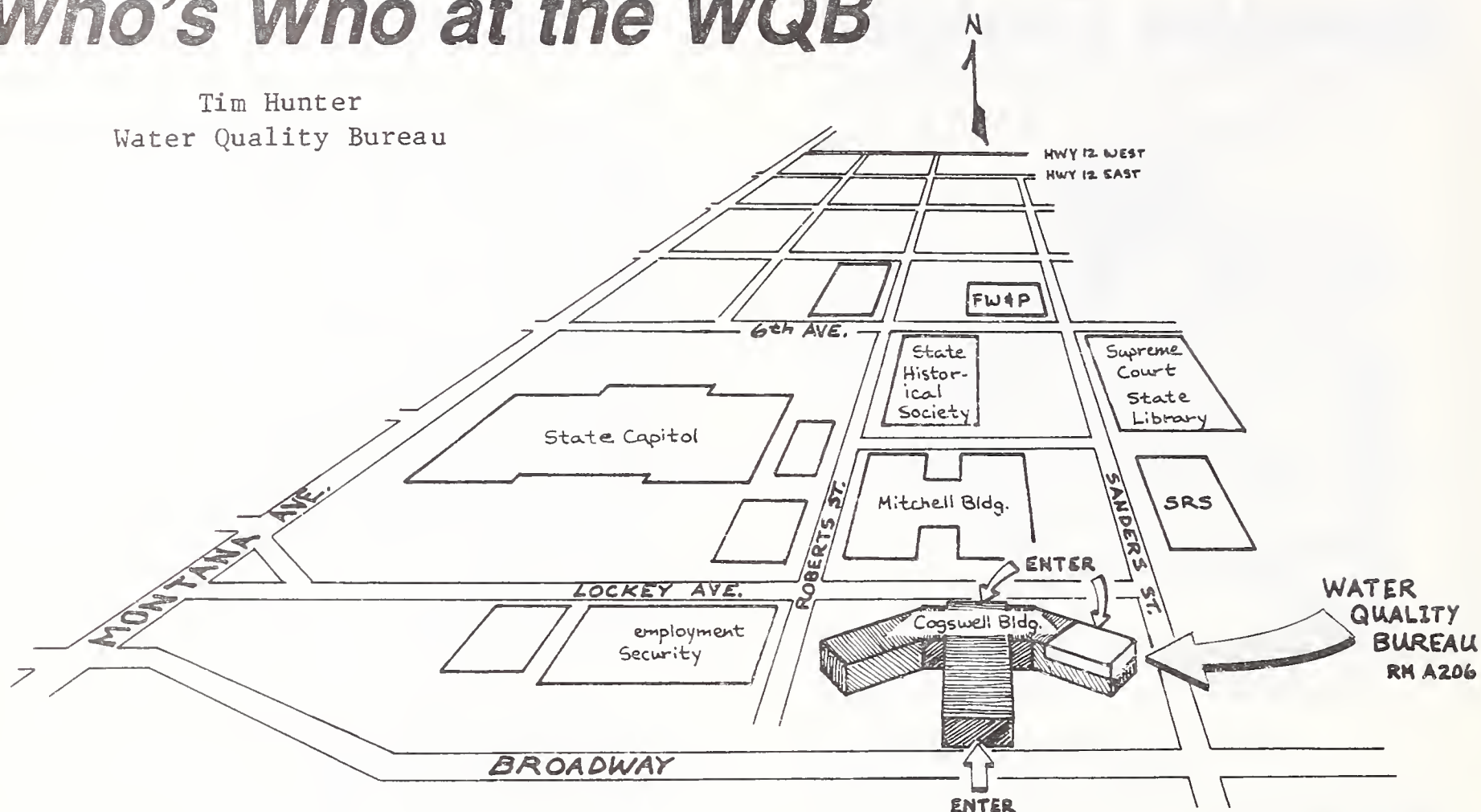
In July 1983, Bill retired from the city of Chinook after suffering from a stroke. We certainly give our best to you, Bill, and hope your recovery continues. We will miss you at the Chinook plant. Your conscientious years of devotion to the water treatment profession are appreciated by all, especially those who drank the water.

NOTE:

The Big Sky Clearwater plans to run an Operator Profile story in every issue. If you know of an operator who has been working in the water or wastewater industry for at least five years and has shown above-average dedication to his or her job, let us know. We will need to know a bit of the person's history, why he or she is an outstanding individual, and a description of the treatment facility where the person is employed. Also send a photograph, preferably black and white.

Who's Who at the WQB

Tim Hunter
Water Quality Bureau



Suppose you had a question about the proper method for determining dissolved oxygen levels in your oxidation ditch. Who would you call? Maybe you have a question relating to your drinking water supply. Who would you contact to find out if your well water is okay to drink? This article will answer these questions and more.

The Water Quality Bureau (WQB) of the Montana Department of Health and Environmental Sciences (MDHES) has responsibility for most water programs in Montana. These include safe drinking water, the National Pollutant Discharge Elimination System (NPDES, or MPDES for Montana) per program, construction grants for wastewater facilities, water quality management, and subdivision review. Funding for many of these programs comes from the Environmental Protection Agency (EPA).

The WQB's main offices are located in the Cogswell Building in the capitol complex in Helena, Montana. Branch offices were formerly operated in Kalispell and Billings. The Kalispell office has been closed but the Billings office remains open for those of you in the eastern part of the state. Jerry Burns is the office manager in Billings. He is assisted by Environmental Engineer Kathy Miller-Hoard.

Starting with the Permits and Enforcement Section, the personnel in the Helena office will be reviewed. Fred Shewman is the head of this section. He can answer general questions about the permit program. Kevin Keenan handles enforcement. Any of you with an illegal wastewater discharge or a permit violation will be hearing from Kevin. Dick Pedersen spends most of his time working with municipal discharge permits. Mike Pasichnyk (pash-nick) handles compliance monitoring and special discharge permits, like those issued for fish hatcheries.

Most of you already know Rosemary Fossum, who ramrods our operator certification program. She can be reached at 444-2691. Rosemary is a part-time worker, but is generally "in" all day on Mondays. A message will be taken if she cannot be reached.

The Construction Grants Section administers the EPA construction grant program. This section also assists with plant inspections, operation and maintenance of wastewater facilities, and operator training. Joe Steiner is the section head. He can answer general questions about the grant program, wastewater treatment and training. Mark Weston, Scott Anderson, and Craig Brawner are environmental engineers who serve as project officers for the various EPA construction grant projects. Tim Hunter and Jan Cranor work on the operation and maintenance aspects of construction grant projects and are involved in operator training.

The Safe Drinking Water Section head is Dan Fraser. He can answer general questions regarding drinking water supplies and compliance with the Safe Drinking Water Act. His section also deals with the operation, maintenance, and construction of water systems and inspection of water and wastewater facilities. Jim Melstad, Rick Rosa, and Roy Wells are the environmental engineers working in the program. Denise Osterman is primarily involved in water system operator training.

The Water Quality Management Section deals with such things as water quality studies, water quality monitoring, stream sampling, and biological monitoring. Loren Bahls is the section head. Loren is our expert on the little critters that live in water. As an accomplished lymnologist, he can answer many questions about the algae, diatoms, and invertebrates that live in our natural waters. Some of the organisms help us in biological treatment, while some cause taste and odor and other problems in our water supplies. Other individuals working in this section include Larry Brown, Ken Chrest, Gary Ingman, and Erich Weber. Erich, by the way, does the artwork for the Big Sky Clearwater.

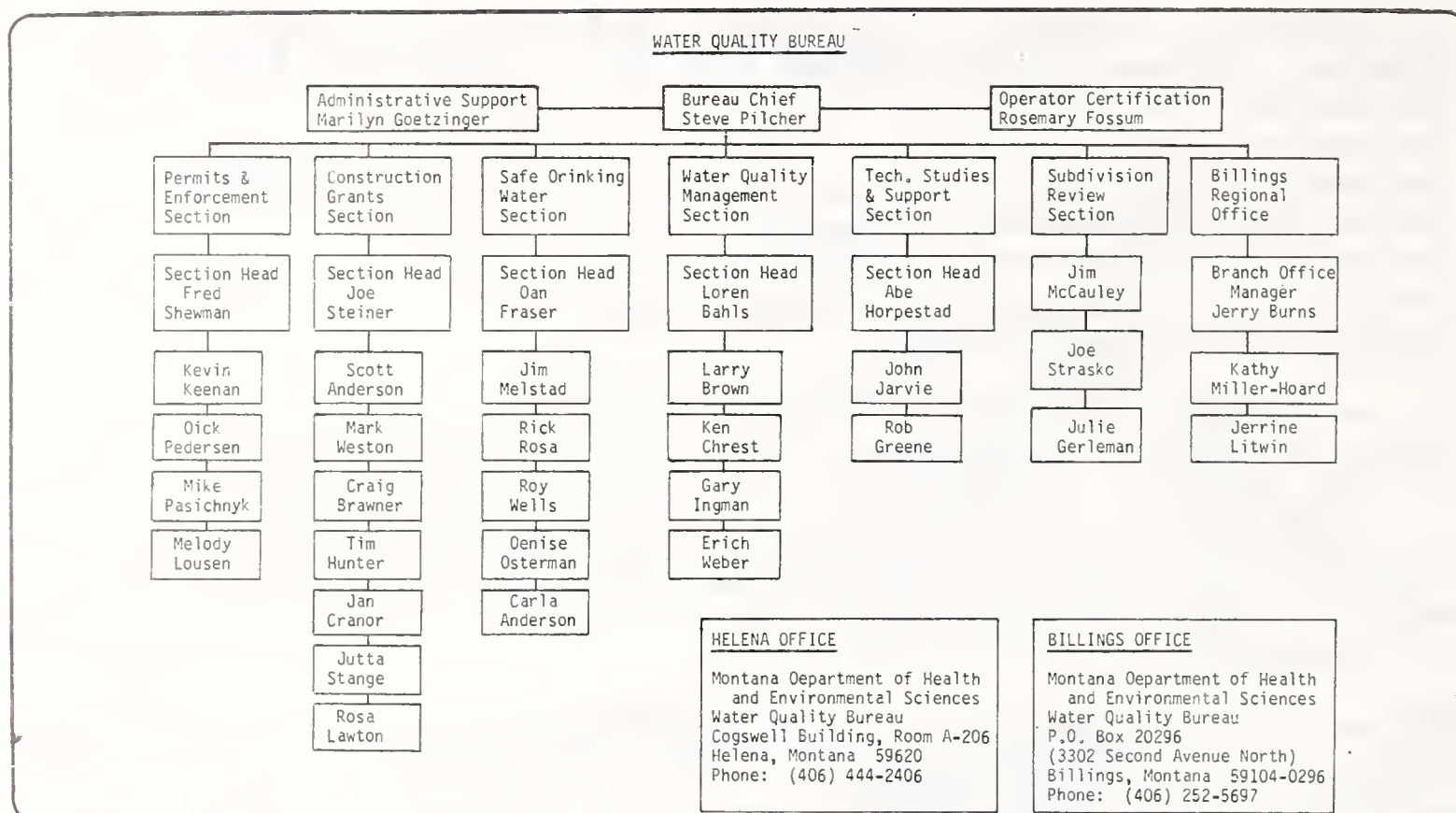
Abe Horpestad, John Jarvie, and Rob Greene make up the Technical Studies and Support group with Abe serving as head of this section.

Subdivision review used to be handled through a separate subdivision bureau. These reviews are now handled by Jim McCauley and Joe Strasko. They make up the Subdivision Review Section which is now part of the Water Quality Bureau.

Some of the most important workers, and those most often overlooked are the administrative support staff. These are the people who type the letters, correct the mistakes, answer the phone, and generally keep things running smoothly at the Water Quality Bureau. Having worked in state government for 27 years, Marilyn Goetzinger can answer just about any question you can dream up. If she can't, she will find the person who can. Marilyn supervises the rest of the administrative staff in her "spare" time. Others working in this area include Melody Lousen--permits, Rosa Lawton (Big Sky Clearwater typist) and Jutta Stange--construction grants, Carla Anderson--drinking water, Julie Gerleman--subdivisions, and Jerrine Litwin, Billings branch office.

Steve Pilcher is the Chief of the Water Quality Bureau. Steve is so busy with supervision and administration of the various water programs, that he tries to leave the day to day contact with the public to the workers mentioned above. They can be reached in Helena at 444-2406 or in Billings at 252-5697.

EPA maintains a Montana office in the Federal Building in Helena. Two EPA employees, Bob Fox and Bill Engle, spend part of their time in the Water Quality Bureau's office acting as liaisons between the EPA office and the WQB. Bob works primarily in discharge permits and compliance. Bill works with the safe drinking water program. Bill can be reached at the Federal Building at 449-5486 in the mornings and at the Water Quality Bureau in the afternoons (444-2406). Bob can usually be reached before 9:00 a.m. and after 4:00 p.m. at the Federal Building. Between 9:00 a.m. and 4:00 p.m. he can be reached at the WQB.



Montana's Drinking Water

Dr. Richard E. Juday, Professor of Chemistry, University of Montana, Missoula

Over the centuries certain wells and springs have become encrusted with myth and legend ascribing miraculous properties of their waters. Thus, Ponce de Leon expected to find the fountain of youth in Florida, although it has not yet been located there. Another such source was a well near Ely in Cambridgeshire, England which was dedicated to St. Etheldreda. Over the years her name became corrupted to Audrey. Because of the concourse of people going there, markets were held nearby where laces and cheap gimcracks were sold--hence our word "tawdry" to describe cheap and showy articles. According to another ancient myth, drinking water from the horn of a "unicorn" prevents stomach disorders and the action of poisons.

It seems likely that the properties of these waters was due not to what they contained, but rather to what they did not contain: pathogenic organisms. People in those days were condemned to drink polluted water that produced

various diseases, so that any source of pure water did appear miraculous. However, in the light of recently developed analytic methods and knowledge of nutrition, it is difficult to ascribe any special properties to drinking water, although purveyors of bottled waters try to maintain the contrary argument.

Actually, the concept that water can carry diseases is one of great antiquity. Writing in about the year 450 B.C., the Greek historian Herodotus, in connection with a military campaign of Cyrus the Elder (reigned from about 555 B.C. to 528 B.C.) against Babylon, pointed out:

"Water too from the Choaspes, which flows by Susa, is taken with him for his drink, as that is the only water the kings of Persia taste. Wherever he travels he is attended by a number of four-wheeled carts drawn by mules, in which the Choaspes water, ready boiled for use, and stored in flagons of silver, is moved with him from place to place."

Thus, 2500 years ago it was understood that boiling water would sterilize it, and that keeping it in silver containers would maintain its purity.

It is, of course, possible for wells and surface waters to contain nutritionally significant concentrations of minerals - particularly trace elements such as iron and manganese, which may be mobilized from soils by anaerobic bacteria. But these trace elements give a water an unpleasant metallic taste, stain the porcelain fixtures red or black, and cause turbidity, so they are not desirable components. There are papers in the recent literature claiming that there are statistically significant decreases in heart and circulatory problems in hard water areas compared with soft water areas, but this is doubtful--especially since the workers did not distinguish between calcium and magnesium hardness and between waters that were soft because of low mineral content or because they contained much sodium but little calcium and magnesium. Furthermore, a glass of milk contains more calcium than a glass of the hardest water and a few leaves of lettuce contain more magnesium than a quart of most hard waters. Thus the best source of minerals is a balanced diet.

On the other hand, excessive amounts of dissolved minerals can cause plugged pipes and water heaters, as well as interfere with the cleaning action of soaps and detergents.

Excessive amounts of sodium sulfate (Glauber's salt) and magnesium sulfate (Epsom salt) can have an unpleasant laxative reaction. (Whenever W. M. Thackeray brought in an apothecary in his stories he always called him "Dr. Glauber" although the original Dr. Glauber was a 17th century German physician and alchemist.) Excessive amounts of sodium in the diet may also be a cause of high blood pressure. Physicians recommend an upper limit of 20 ppm sodium for such patients. This may be a little low but certainly amounts above 100 ppm, should be avoided if possible.

While 1 ppm of fluoride in water helps produce sound teeth in children, amounts considerably in excess of this can occur in Eastern Montana and in the Yellowstone Park area. Children raised on this water can develop teeth that have brown spots on them (mottled). Although the teeth are sound, the color change is irreversible.

It is not uncommon to find wells in Montana that contain excessive amounts of nitrate. In rural areas this can arise from runoff from fertilized fields, but in urban areas is usually due to septic pollution. Indeed, the nitrate level of well water is a valuable diagnostic test for polluted water. In the digestive system the nitrate is partially reduced to nitrite. In the body, both nitrite and nitrate can render the hemoglobin incapable of carrying oxygen by oxidizing the iron to the ferric state. Small children are especially sensitive to this contaminant.

Deep well waters in Eastern Montana may also be contaminated with hydrogen sulfide which gives a bad odor and taste to the water. On standing in contact with the air, it is rapidly removed by oxidation, however, so no special purification is needed.

The origin of the terms "hard" and "soft" as applied to water is somewhat obscure but evidently water was termed "hard" if it was difficult to form a lather with soap and "soft" if it was easy. The U.S. Geological survey hardness scale is in Table 1.

Table 1. Hardness as mg/L CaCO_3

0 - 60	Soft
61 - 120	Moderately Hard
121 - 180	Hard
over 180	Very Hard

To convert the calcium and magnesium values to mg/L CaCO_3 , multiply the calcium value by 2.497 and the magnesium value by 4.116 and then add the two numbers. If the principal anion present is bicarbonate, the hardness is termed "temporary" because the bicarbonate is converted to carbonate by heat and it then precipitates out as calcium or magnesium carbonate (teakettle scale). If the principal anion is thermally stable (sulfate is the most common) then the hardness is termed "permanent." Since heat and evaporation of hard water will deposit a water insoluble scale, difficult to remove which may damage plumbing, it may be desirable to soften the water. This is commonly done by passing it through a bed of zeolite mineral containing sodium ions on its surface. These exchange for the calcium and magnesium ions in the ratio of 2 sodiums for one each of magnesium or calcium. The zeolite remains behind. When it is depleted of its sodium, the mineral is revived by soaking it with a very strong salt solution which causes the ion exchange to reverse itself and restore sodium to the surface of the zeolite. Since the softening process may greatly increase the level of sodium in the water, drinking or cooking with softened water is not recommended. The effect of softening on the composition of water is shown in Table 2.

Table 2. The effect of softening on cation concentrations in a petroleum company well. Units are in ppm (mg/L).

	<u>Hard</u> <u>H₂O</u>	<u>Softened</u> <u>H₂O</u>
Calcium	301	84
Magnesium	169	35
Sodium	155	668

The ultimate limit of salt concentration in drinking water is determined by the concentrating power of the kidney. Thus humans cannot drink sea water because the kidney is not capable of excreting such large amounts of salt, which would then accumulate in the system and raise the osmotic pressure of the fluids to a lethal level. Some species that can drink sea water such as sea gulls and bony fish have special salt glands to get rid of the excess salt. Sharks (elasmobranchs) maintain osmotic equilibrium by keeping a high concentration of urea in the blood to make up for the lower concentration of salts.

Taking into account the various factors discussed above, governmental agencies including the Environmental Protection Agency and the World Health Organization have arrived at maximum contaminant levels (MCL's) for various constituents commonly found in water that have adverse health effects and recommended limits for other constituents that influence the aesthetic quality of drinking water. These are summarized in Table 3.

While sodium is not mentioned in Table 3, its possible harm to the health, particularly to those with heart and circulatory problems, was discussed above. Unfortunately, it cannot be removed easily by ion exchange as in the water softener. Since many of the wells in Eastern Montana are quite high in sodium, this can present a problem. Small stills for household use are available as are reverse osmosis apparatuses which remove the ions by a process of ultra-filtration. Either method is satisfactory and the particular method used should be determined by the initial cost and the cost of operation.

It is difficult to make a precise summary of well water quality in Montana, but Eastern Montana wells are usually more highly mineralized than wells west of the divide. The shallow wells are high in calcium, magnesium, and sodium while the deeper ones contain much sodium, but little

calcium or magnesium. The deep wells may also contain excessive amounts of fluoride. Both shallow and deep wells usually contain from 500-1000 ppm dissolved solids. Since calcium fluoride is water insoluble, wells

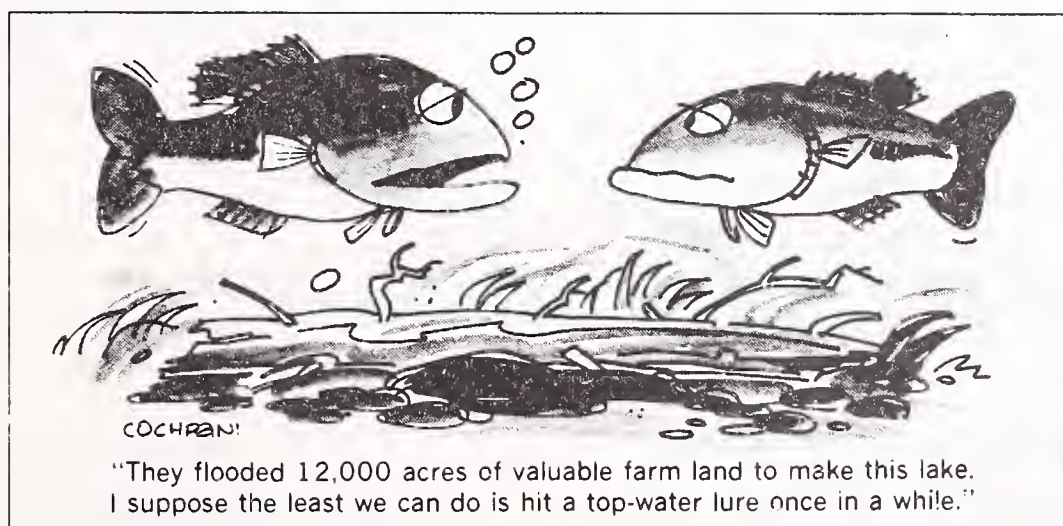
high in calcium do not contain much fluoride. In Western Montana most of the creeks are fairly soft. The well water is harder but usually does not contain more than 200-500 ppm dissolved solids.

Table 3. Montana Drinking Water Standards

Constituent	MCL, Maximum Contaminant Level (mg/l)	Recommended Level (mg/l)
1. Arsenic	.05	N/A
2. Barium	1.0	
3. Cadmium	.010	
4. Chromium	.05	
5. Lead	.05	
6. Mercury	.002	
7. Nitrate (as N)	10.0	
8. Selenium	.01	
9. Silver	.05	
10. Fluoride	2.4	
11. Chloride		250
12. Color #		15 color units
13. Copper		1
14. Corrosivity #		non-corrosive
15. Foaming Agents		.5
16. Iron		.3
17. Manganese		.05
18. PH *		6.5-8.5 units
19. Sulfate		250
20. Total Dissolved Solids (TDS)		500
21. Zinc		5
22. Endrin	.0002	
23. Lindane	.004	
24. Methoxychlor	.1	
25. Toxaphene	.005	
26. Chlorophenoxys		
2,4-D	.1	
2,4,5-TP Silves	.01	
27. Total trihalomethanes	.1	
28. Turbidity #	1 NTU	

*A logarithmic scale of acidity. A ph of 7 is neutral; below 7 acid; above 7 alkaline.

#Arbitrary units, not milligrams per litre.



Water Tank Seminar

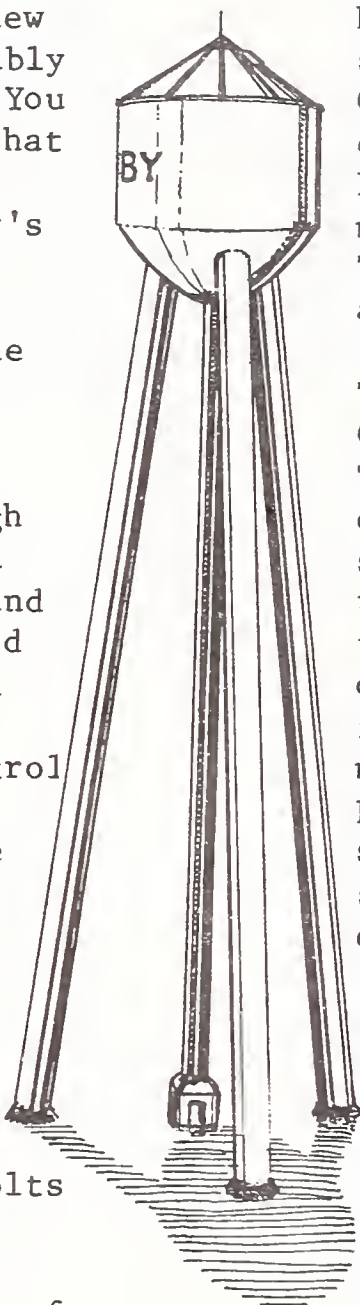
If your town had just installed a new water storage tank, you would probably not be terribly worried about it. You might think that there isn't much that can go wrong, but there are exceptions. You've heard of "Murphy's Law;" an example of the things that can go wrong was a tank in the mountains of North Carolina. By the map this location was on a +5 °F (-15 °C) isothermal line. That's not very cold compared to most of Montana. The location was at a high elevation. The ground storage tank was the second one on the system, and the water level in it was controlled by an altitude valve in an unheated and uninsulated concrete pit. The uninsulated 1/2 inch (12.7 mm) control pipe apparently froze, causing the altitude valve to fail to sense the full tank. The tank overflowed and ice soon plugged the overflow pipe. The roof hatch and vent also froze over from freezing rain or the overflowing water.

The tank apparently froze solid, pushing the bottom down. Anchor bolts had been specified on this contract although not needed for wind loads. Some of the anchor bolts pulled out of the concrete. Other anchor bolts stayed in the concrete but pulled the anchor bolt chairs out of the steel tank wall, ripping holes in the steel.

When the tank thawed enough for the water to drain from the tank, the ellipsoidal roof sucked in due to the vacuum. (The vent and hatch were frozen over). In other words, this was about as classic a failure as could occur on any one tank.

It was a new tank, not yet accepted by the owner, but in service on the system. This created untold questions of liability between the owner, engineer, contractor, and subcontractor.

If you wish to avoid similar problems we suggest that you attend the upcoming seminar on Water Storage Tanks.



The seminar will take place on February 15, 1984 in Room 289 of the Federal Building, 301 S. Park, in Helena, Montana. It is being sponsored by the Joint Education Committee of the MSAWWA and MWPCA in cooperation with the Water Quality Bureau. The cost is \$20.00 for members and the same for non-members. The seminar will begin at 10:00 a.m. and will end sometime around 3:00 p.m.

The seminar will be conducted by E. Crone Knoy, P.E. who is President of Tank Industry Consultants, Inc. His company specializes in design, specification, and inspection of water tanks. Topics to be discussed during the seminar include cold weather operation of water storage tanks, inspection of new tanks, and maintenance of existing tanks. Mr. Knoy has presented papers on these subjects at AWWA distribution system symposiums and at the 1983 AWWA annual conference.

This promises to be an excellent seminar. If you plan to attend, we urge you to fill out the pre-registration form with your payment to reserve yourself a spot. You can also register at the seminar. Please note that the seminar is in Helena although the pre-registration form is to be mailed to the Joint Education Committee treasurer, Geoff Hughes, who lives in Kalispell.

Please make checks or vouchers payable to the Joint Education Committee and send to:

c/o Geoffrey Hughes
City of Kalispell
P.O. Box 1035
Kalispell, Montana 59901

Name: _____

Address: _____

Employer: _____

Payment

Method: _____

Number attending: _____

Amount enclosed: _____

Business phone: _____

Certification Examinations

ON SATURDAY, MARCH 17, 1984 at 9:30 A.M.

Examinations for certification as a Water Distribution Operator, Water Treatment Plant Operator, and Wastewater Plant Operator will be given at these six locations:

IN BILLINGS in the Petro East Conference Room of the Student Union Building of Eastern Montana College (at the corner of 27th Street and Rimrock Road between the two high-rise dorms)

IN BUTTE in Room 301 of the Mining and Geology Building, Montana Tech

IN GREAT FALLS in Room S119 of the Science Amphitheater, College of Great Falls

IN HAVRE in Room 103-4 of the Math/Science Building, Northern Montana College

IN MILES CITY in Room 106 of the Miles Community College, 2715 Dickinson

IN MISSOULA in Room 102 of the Liberal Arts Building, University of Montana (large, three-story building on the left hand side of the Oval)

Everyone taking examinations must submit certification applications AND examination registration slips before March 2, 1984. Effective January 1, 1984, the following certification fees payable with application are applicable:

Class 1--\$27; Class 2--\$22; Class 3--\$17; Class 4--\$12; Class 5--\$10

Those who have previously submitted certification applications and fees for fiscal year 83-84 will only need to submit Examination Registration Slips with a fee of \$5 per examination by March 2. PLEASE RETAIN THE UPPER PORTION OF THIS NOTICE to know the time and place of your examination. Checks should be made payable to: DHES--Operator Certification. For application materials or information contact:

DHES--Water Quality Bureau
Water and Wastewater Operator Certification
Room A-206, Cogswell Building, Helena, MT 59620
Phone: 444-2691

EXAMINATION REGISTRATION SLIP

(detach and return with \$5 per examination by March 2, 1984)

I will take the examination(s) I have checked below in:

	<u> </u> Billings	<u> </u> Butte	<u> </u> Great Falls	<u> </u> Havre	<u> </u> Miles City	<u> </u> Missoula	
			1	2	3	4	5
A--Water Distribution						*	
B--Water Treatment						*	5AB
C--Wastewater							

NAME _____ ADDRESS _____

*Those taking both 4A and 4B examinations will take a combination exam and remit \$5 only.

Groundwater Monitoring Required

Scott Anderson,
Water Quality Bureau

The State of Montana has a number of municipal wastewater treatment systems which use rapid infiltration basins for disposal of treated effluent. Examples include Bozeman where the infiltration basins are used to meet an ammonia limit placed upon their discharge to the East Gallatin River. Infiltration basins can be very effective in achieving ammonia reduction by nitrification. While these systems have the advantage of eliminating a discharge to surface waters, a potential for groundwater degradation exists when large volumes of treated effluent are applied at a high rate over a relatively small surface area.

The implementation of the Montana Groundwater Pollution Control System (MGDCS), ARM 16.20.1003, has established standards for groundwater quality to protect existing and beneficial uses of groundwater. A permitting process was developed under the MGPCS with similar requirements to those systems which discharge to surface waters. One exception to the similarity is the exclusion from the permit requirements for those groundwater disposal systems that were reviewed and approved by the Montana

Department of Health and Environmental Sciences (MDHES). Excluded disposal systems which the department feels are likely to adversely affect groundwater can be required to submit monitoring information. Municipal wastewater treatment systems that use rapid infiltration basins for ultimate disposal of treated effluent are likely to adversely affect groundwater and will be required to monitor groundwater on a systematic basis. Monitoring requirements will include a monthly determination of groundwater levels and a quarterly sampling to determine nitrate and nitrite concentrations, specific conductance and chloride concentrations. Monitoring frequency may be reduced after a period of time if no significant trends in groundwater degradation are observed.

Monitoring groundwater around wastewater disposal systems will allow the MDHES a means of quantifying long term changes in groundwater quality. Long term monitoring data may also become useful in protecting the disposal system owner from future litigation in cases of groundwater degradation.

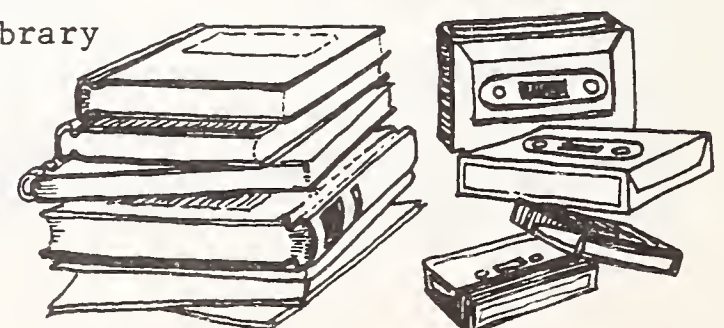
The Montana Water Quality Bureau can be contacted at 444-2406 for further information on groundwater monitoring.

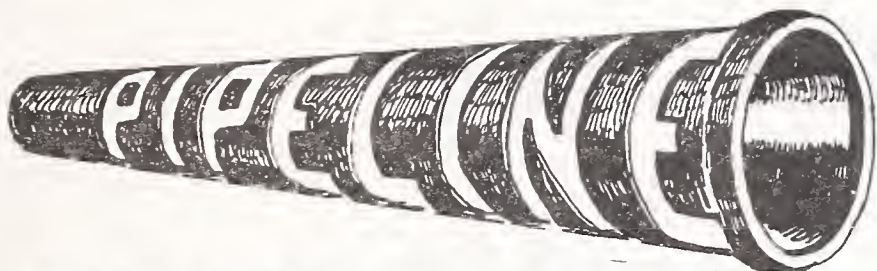
Training Resources Catalog

The training resources library at Northern Montana College is officially open! Many of you received a catalog of the library holdings in the mail. The catalog has a complete listing of the training manuals, reference books, slides, cassette tapes, and video cassettes that are available for loan. Complete instructions for borrowing library materials and an order form are also included. All materials are available for loan period of two weeks with a renewal option depending on demand. The only charge for the service is postage. Anyone in Montana can utilize the library. So what are you waiting for? If you didn't get a catalog and you want one, write to:

Water Quality Technology Training Resource Library
Science Department
Math Science Building
Northern Montana College
Havre, Montana 59501

or call 265-7821, ext. 3257.





More Red Lagoons

The story of the red lagoons continues with our latest report. This one comes from David Haverfield, manager of the Lolo sewer and water district. David reports that he too has noticed the red lagoon phenomenon in the polishing ponds that follow the Lolo treatment plant. His experience shows that the occurrence of the condition corresponds with periods of good effluent quality.

Dave reports another problem: duckweed. He gets blooms of duckweed in the lagoon which he fears are cutting out sunlight which is needed by the algae in the lagoon. He suggests applying herbicides to control the duckweed. We at the WQB are very hesitant to use herbicides in lagoons and suggest physical removal methods.

If you have noticed a redness in your lagoon, keep us informed. We would be interested in examining a sample of the lagoon to determine what is causing the condition.

FOR SALE

Black and white sewer tele-inspection unit 1970 Halliberton Model 350, complete with Sony video and audio recorders. Make offer.

Also---

Various Tri-Seal and Trident water meters, various sizes. Will sell very reasonably. Perfect for small community wishing to meter their water supply.

For more information contact the City of Great Falls Water Department:

Dan Kandilas 727-5881, ext. 421 or
Lyle Meeks 727-5881, ext. 422

You may examine these items during the convention in Great Falls if you're interested.

Job Announcement

The City of Hamilton, Montana is accepting applications for the position of Wastewater Treatment Plant Foreman. The position will be responsible for all phases of operation, maintenance, and supervision of Hamilton's new 2.7 MGD plant and the sewage collection system. Salary will range from \$1,500.00 to \$1,750.00 per month. Minimum requirements include Montana Class II wastewater certification, four years experience, and high school graduation. Reply in confidence by February 17, 1984 with resume, references, and salary requirements to:

City Administrator
City of Hamilton
City Hall
175 South Third Street
Hamilton, MT 59840

or write to the same address for a complete listing of minimum job qualifications. Those meeting minimum qualifications will be scheduled for an oral interview.

METCO Needs You

When METCO, the Montana Environmental Training Coordinating Organization, was established in 1981, it was felt that there was a genuine need to coordinate, promote, and evaluate training opportunities in the environmental field. METCO was established to serve this purpose. However, the group has been unsuccessful due to lack of interest from members and potential members. The home base for METCO is being transferred to Northern Montana College. In METCO we have a mechanism for improving training opportunities in Montana. If you are interested in helping to re-activate METCO, please contact:

Martha Anne Dow
Science Department
Math-Science Building
Northern Montana College
Havre, Montana 59501

phone--265-7821, ext. 3257

Operator Certification Corner

1. How many pounds of HTH (70% available chlorine) will it take to disinfect a 500,000 gallon storage tank using a 50 mg/l chlorine solution?
 - A. 146
 - B. 208
 - C. 298
 - D. 372
2. Which of the following are sources of wastewater carried by collection systems?
 - A. Digester supernatant
 - B. Exfiltration
 - C. Homes
 - D. Drainfields
3. The volatile solids content of raw (primary) sludge is usually about 70% - 75% of the total solids. If it is appreciably less than this, you should suspect:
 - A. The presence of grit.
 - B. Poor settling in the primary tank.
 - C. Broken or damaged sludge collectors.
 - D. The water in your community has a high iron content.
4. The effects of cavitation can be found in a centrifugal pump
 - A. Impeller
 - B. Stuffing box
 - C. Follower
 - D. Lantern ring
5. In a distribution system, which type of valve is usually used for isolation of a section?
 - A. Check
 - B. Gate
 - C. Globe
 - D. Needle
6. The chlorine residual in water may be determined using the reagent
 - A. Diethyl-p-phenylene-diamine (DPD)
 - B. Ethylenediamine tetraacetic acid (EDTA)
 - C. Polychlorinated biphenyls (PCB)
 - D. Sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$)
7. In electrical circuits, a/an _____ is used to reduce the voltage where necessary.
 - A. Ammeter
 - B. Sensor
 - C. Thermal Overload
 - D. Transformer

	A	4.
D	A	3.
A	C	2.
B	C	1.

ANSWERS:

Calculations

Calculations

Water Quality Bureau
Department of Health
& Environmental Sciences
Room A206, Cogswell Bldg.
Helena, MT 59620

TO:

1,750 copies of this public document were published at an estimated cost of 56¢ per copy, for a total cost of \$980.42, which includes \$787.92 for printing and \$192.50 for distribution.